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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,085	07/08/2003	Saikumar Jayaraman	2207/ 1212002	9663

7590

10/12/2005

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EXAMINER

SELLERS, ROBERT E

ART UNIT

PAPER NUMBER

1712

DATE MAILED: 10/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/616,085

Applicant(s)

JAYARAMAN ET AL.

Examiner

Robert Sellers

Art Unit

1712

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 and 26 September 2005.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-24 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 19-24 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

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1. The 35 U.S.C. 112, first and second paragraphs, rejections applied in the non-Final rejection mailed July 21, 2005 is rescinded due to the deletion of the molecular weight of 1000 for the curing agent. The amendment filed September 21, 2005 requires the maleic anhydride polymers comprising styrene to have a molecular weight of about 1600 which is supported by Examples 1-6 on pages 10-12 of the specification.

2. The 35 U.S.C. 103(a) rejection over Tuller et al. Patent No. 4,042,550 and Lim Patent No. 5, 925,934 in view of Langari et al. Patent No. 6,261,871 is withdrawn in response to the amendment filed September 21, 2005 which limits the molecular weight of the maleic anhydride polymers comprising styrene to about 1600, thereby precluding the alkylstyrene-maleic anhydride hardener of Tuller et al. possessing a molecular weight of below about 1000 (col. 1, lines 56-59).

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 19-24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors had possession of the claimed invention at the time the application was filed.

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3. There is no support on page 6, paragraph 11, the last three lines for the species of carboxylic acids for R of the maleic anhydride polymers comprising (bridged) cyclohexane in claim 27.

4. Page 5, the last line and page 8, Scheme 6 only enables styrene/maleic anhydride copolymers as opposed to the claimed maleic anhydride polymers comprising styrene. The term "comprising" encompasses other non-functional and functional monomers as well as any derivatives or modifications thereof not described.

5. The repeating unit for the styrene/maleic anhydride copolymer is inaccurately depicted. The styrene contains a vinyl group pendant from the phenyl ring which is the source of bonding to the maleic anhydride group, not the depicted bonding of the phenyl ring to the maleic anhydride.

Claims 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konarski et al. Patent No. 6,458,472; Charles et al. Patent No. 6,528,169 and Sozansky et al. Patent No. 5,953,814 in view of Japanese Patent No. 2001-139669.

6. Konarski et al. (col. 3, lines 40-44 and 51-59), Charles et al. (col. 1, lines 24-40 and 60-62; and col. 8, lines 15-21) and Sozansky et al. (col. 3, lines 17-38 and col. 7, lines 24-28) disclose methods for fabricating a semiconductor device comprising electrically connecting integrated circuit chips to a substrate by reflowing the solder bumps and underfilling the gap between the chip and the substrate with a composition containing an epoxy resin and an anhydride curing agent.

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Konarski et al. (col. 3, lines 51-54) sets forth the application of the underfill during solder reflow.

7. The claimed copolymer of maleic anhydride with either a (bridged) cyclohexane, norbornene or styrene as the curing agent is not recited. The Japanese patent espouses an semiconductor underfilling formulation (Derwent abstract) comprising an epoxy resin (CAPLUS abstract, AB, line 12) and a norbornene-maleic anhydride copolymer as a curing agent (translation, page 2, paragraph 19, line 1 and page 6, formula 8).

8. It would have been obvious to employ the norbornene-maleic anhydride copolymer of the Japanese patent as the anhydride curing agent for the epoxy resin underfill in the semiconductor fabrication methods of Konarski et al., Charles et al. and Sozansky et al. in order to improve the dielectric properties (Derwent abstract, Novelty section, line 3; CAPLUS abstract, AB, line 8; Patent Abstracts of Japan, Problem to be Solved section, line 3 and the translation, page 1, paragraph 5, lines 3-5).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert Sellers whose telephone number is (571) 272-1093. The examiner can normally be reached on Monday to Friday from 9:30 to 6:00. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).

rs
10/4/2005



ROBERT E.L. SELLERS
PRIMARY EXAMINER